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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|--------------------------------|------------------|
| 10/608,032 | 06/30/2003 | Toshio Tsukakoshi | 239720US90CONT | 7562 |
| 22850 | 7590 | 12/16/2005 | | |
| OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | EXAMINER STOCK JR, GORDON J | |
| | | | ART UNIT | PAPER NUMBER |

2877

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|---|--------------------|--|
| Office Action Summary | Application No. <input checked="" type="checkbox"/> | Applicant(s) | |
| | 10/608,032 | TSUKAKOSHI, TOSHIO | |
| | Examiner | Art Unit | |
| | Gordon J. Stock | 2877 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4, 6-13, 15-19, 73-81, 85-89, 110, 112-114, 117-122, 124-126, 128-135 and 139-141 is/are allowed.
- 6) ☒ Claim(s) 64-66, 82-84, 94-104 and 142-145 is/are rejected.
- 7) ☒ Claim(s) 5, 14, 105 and 116 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continuation of Disposition of Claims: Claims pending in the application are 1-19,64-66,73-89,94-105,110,112-114,116-122,124-126,128-135 and 139-145.

Art Unit: 2877

DETAILED ACTION

1. The Amendment received on September 26, 2005 has been entered into the record.

Claim Objections

2. **Claim 5** is objected to for the following: “arranged an object plane” should read – arranged in an object plane--. Correction is required.
3. **Claims 14, 95, 102, 116** are objected to for the following: “the least-squares method” lacks antecedent basis. Corrections are required.
4. **Claim 105** is objected to for the following: “relatd” of line 6 should read –related--. Correction is required.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. **Claims 142-145** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Specifically, the claimed invention in **claims 142-145** is directed to a program, functional descriptive material, which is non-statutory subject matter. Please see MPEP 2106 IV. B. 1.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

Art Unit: 2877

subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. **Claims 64-66, 82-84, 94-104 and 144** are rejected under 35 U.S.C. 102(e) as being anticipated by **Hamatani et al. (6,961,115)**.

As for **claims 64-66**, Hamatani in a specification determining method and projection optical system discloses the following: a measuring process in which information related to wavefront aberration of said projection optical system is measured (Fig. 11: step 4); said image forming characteristic is adjusted by driving an optical element of said projection optical system based on data of a relation between an adjustment amount of said optical element and a change in coefficients of each term in a Zernike polynomial, and said information related to wavefront aberration (Fig. 11: step 5; Fig. 5: 212-230; col. 51, lines 30-60; col. 46, lines 30-64); wherein said information related to wavefront aberration is expressed in a Zernike polynomial, and different weighting is performed on a plurality of terms in said Zernike polynomial to decide said adjustment amount of said optical element, in order to adjust an image forming characteristic of a plurality of types of said projection optical system (col. 6, lines 10-20; col. 9, lines 35-55; col. 42, lines 20-35; col. 46, lines 30-64; col. 7, lines 40-55; Fig. 5: 228-234); an adjusting process in which at least one image forming characteristic of said projection optical system is adjusted using said image forming characteristics adjusting method according to claim 64 (Fig. 5: 228 and 234) and a transferring process in which said pattern is transferred onto said object using said projection optical system whose image forming characteristic is adjusted (col. 8, lines 40-50).

As for **claims 82-84**, Hamatani in a specification determining method and projection optical system discloses the following: a storage unit that stores data related to a relation between an adjustment amount of an optical element of said projection optical system and a

Art Unit: 2877

change in coefficients of each term in a Zernike polynomial (col. 21, lines 55-67; col. 22, lines 1-3) and an adjusting unit that adjusts at least one image forming characteristic of said projection optical system based on information related to wavefront aberration of said projection optical system (Fig. 2: 50 with 80); said information related to wavefront aberration is expressed in a zernike polynomial and said adjusting unit decides said adjustment amount of said optical element by performing weighting on a plurality of terms in said Zernike polynomial to adjust said image forming characteristic of a plurality of types of said projection optical system (col. 6, lines 10-20; col. 9, lines 35-55; col. 42, lines 20-35; col. 46, lines 30-64; col. 7, lines 40-55; Fig. 5: 228-234); in said lithographic process in order to transfer a pattern of a mask to a substrate using an exposure apparatus having a projection optical system, an image forming characteristic of said projection optical system is adjusted based on data of a relation between an adjustment amount of an optical element of said projection optical system and a change in coefficients of each term in a Zernike polynomial, and information related to wavefront aberration of said projection optical system (col. 8, lines 40-50; (Fig. 11: step 5; Fig. 5: 212-230; col. 51, lines 30-60; col. 46, lines 30-64).

As for **claims 94-104**, Hamatani discloses everything as above (see **claim 64**). In addition, Hamatani discloses an adjustment amount of said optical element is decided using a Zernike sensitivity table of an image-forming characteristic of said projection optical system that becomes an evaluation item (col. 6, lines 35-50; col. 11, lines 1-10); in order to adjust said image forming characteristic, an adjustment amount of said optical element is decided using the least-squares method (col. 25, lines 60-67; col. 26, lines 35-45); when different patterns are each projected by said projection optical system, an adjustment amount of said optical element is

Art Unit: 2877

decided using the Zernike sensitivity table for each of said patterns (col. 4, lines 23-30; col. 36, lines 15-33; col. 38, lines 40-60); when said image forming characteristic that becomes an evaluation item includes image forming characteristics of a plurality of types, an adjustment method of said optical element is decided using the Zernike sensitivity table for each of said image forming characteristics of a plurality of types and when a plurality of projection conditions including a plurality of illumination conditions are settable on projection of a pattern by said projection optical system, an adjustment amount of said optical element is decided using the Zernike sensitivity table for each of said projection conditions (col. 6, lines 10-20; col. 9, lines 35-55; col. 42, lines 20-35; col. 46, lines 30-64; col. 7, lines 40-55; Fig. 5: 228-234); information related to a wavefront of said projection optical system is measured at each of a plurality of points within a predetermined area, in which a pattern is projected, in a field of said projection optical system, and the measurement information is used for adjustment of said image forming characteristic (Figs. 6, 9a, 9b; 10a; 10b); in order to adjust said image forming characteristic, an adjustment amount of said optical element is decided using a weighting function (col. 6, lines 10-20; col. 9, lines 35-55; col. 42, lines 20-35; col. 46, lines 30-64; col. 7, lines 40-55; Fig. 5: 228-234); for decision of said adjustment amount, a least squares method is used (col. 25, lines 60-67; col. 26, lines 35-45); for decision of said adjustment amount, a Zernike sensitivity table is used, said zernike sensitivity table being obtained by giving a predetermined value of aberration to each term in a Zernike polynomial and calculating an image forming characteristic that becomes an evaluation item of said projection optical system in each of a plurality of terms in said Zernike polynomial (col. 42, lines 35-67; col. 43, lines 1-35); information related to wavefront of said projection optical system is measured at each of a plurality of points within a

Art Unit: 2877

predetermined area, in which a pattern is projected, in a field of said projection optical system, and the measurement information is used for decision of said image forming characteristic (Figs. 6, 9a, 9b; 10a; 10b).

As for **claim 144**, Hamatani discloses the following: a computer program with a measuring procedure in which information related to wavefront aberration of said projection optical system is measured (Fig. 11: step 4); an adjusting procedure wherein said image forming characteristic is adjusted by driving an optical element of said projection optical system based on data of a relation between an adjustment amount of said optical element and a change in coefficients of each term in a Zernike polynomial, and said information related to wavefront aberration (Fig. 11: step 5; Fig. 5: 212-230; col. 51, lines 30-60; col. 46, lines 30-64; col. 26, lines 10-20; col. 26, lines 60-67).

The applied reference has a common assignee and one common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Art Unit: 2877

Allowable Subject Matter

9. **Claims 1-4, 6-13, 15-19, 73-81, 85-89, 110, 112-114, 117-122, 124-126, 128-135 and 139-141** are allowed.

And **claims 5, 14, 105, and 116** would be allowable if rewritten to overcome the objections from above.

As to **claim 1**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method of adjusting an image forming state of a pattern image projected onto an object via a projection optical system the particular optimizing and calculating step, in combination with the rest of the limitations of **claims 1-19 and 139**.

As to **claim 73**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an exposure apparatus the particular computing unit, in combination with the rest of the limitations of **claims 73-81**.

As to **claim 85**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an exposure apparatus the particular computing unit, in combination with the rest of the limitations of **claims 85-89**.

As to **claim 105**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an exposure method the particular calculating step, in combination with the rest of the limitations of **claim 105**.

As to **claim 110**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an exposure method the particular calculating step, in combination with the rest of the limitations of **claims 110, 112-113, and 140**.

Art Unit: 2877

As to **claim 114**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an exposure method the particular calculating and optimizing steps, in combination with the rest of the limitations of **claims 114, 116-121, and 141**.

As to **claim 122**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an exposure apparatus the particular computing unit, in combination with the rest of the limitations of **claims 122, 124-126, and 128-135**.

Response to Arguments

10. Applicant's arguments, see Remarks, filed September 26, 2005, with respect to the previous rejection under 35 U.S.C. 102(e) with Hayano (6,548,312) have been fully considered and are persuasive. Due to the persuasiveness of the arguments and due to the amendment of the claims, the previous rejection under 35 U.S.C. 102(e) has been withdrawn. As for the allowable subject matter set forth in the previous action in regards to **claims 64-66, 82-84, 94-104 and 144** the Examiner apologizes for the inconvenience but upon further search a rejection has been made. See above. In addition, the Examiner apologizes for the inconvenience, but upon further consideration of **claims 142-145** a rejection under 35 U.S.C. 101 has been made. See above.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 2003/0047694 A1 to Van Der Laan

U.S. Patent 6,368,763 to Dirksen et al.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

Art Unit: 2877

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (571) 273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

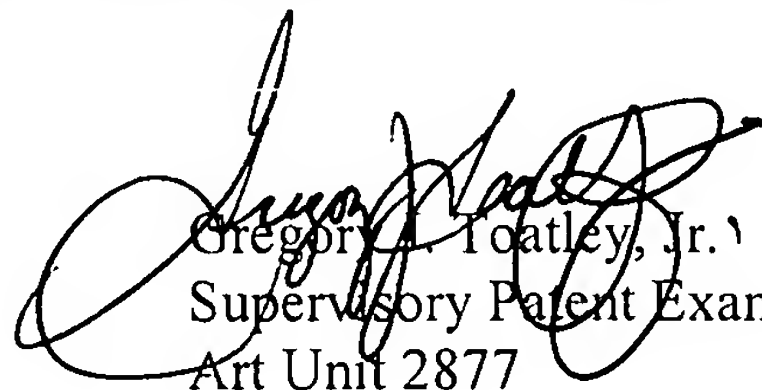
The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



gs
December 8, 2005



Gregory J. Toatley, Jr.
Supervisory Patent Examiner
Art Unit 2877

12 Dec 05